Q-FOG

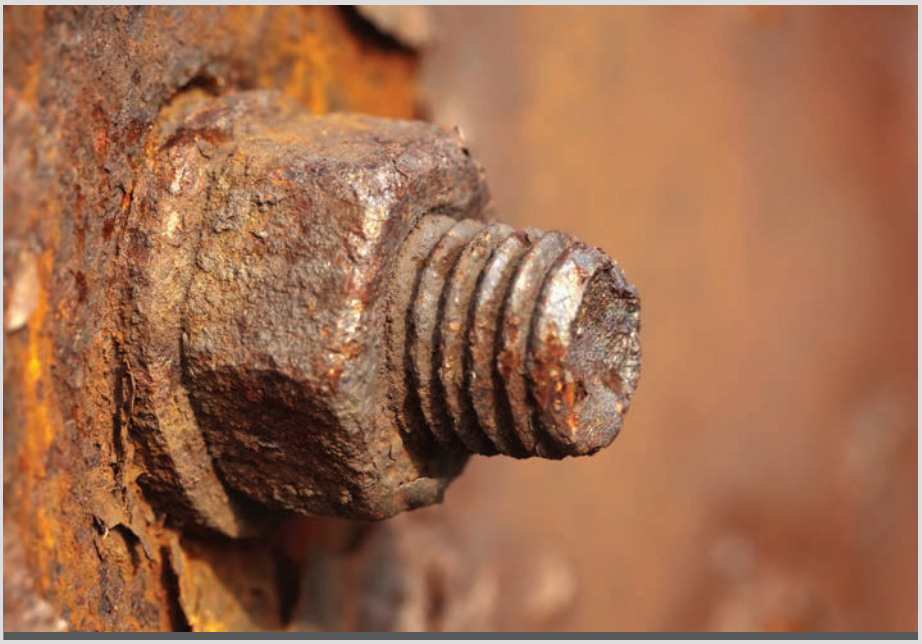
Cyclic Corrosion Testers

We make corrosion testing simple.

Q-LAB

Corrosion Basics

Corrosion causes billions of dollars in product and infrastructure damage every year. It degrades the useful properties of materials, especially metals. This can include loss of strength, appearance, and permeability to liquids and gases. In just a few days or weeks, a Q-FOG tester can reproduce the damage that occurs over months or years outdoors.



Cyclic Corrosion Testers

Cyclic corrosion testing provides the best possible laboratory simulation of natural corrosion. Current research indicates that cyclic corrosion testing results are similar to outdoors in resulting structure, morphology, and relative corrosion rates. Prior to cyclic testing, conventional salt spray (a continuous salt spray at 35˚C) was the standard way to simulate corrosion in a lab. Because conventional salt spray methods failed to mimic the natural wet/dry cycles of outdoors, test results frequently provided poor correlation to outdoors.

In a Q-FOG® cyclic corrosion tester, specimens are exposed to a series of different environments in a repetitive cycle that mimics outdoors. Simple cycles, such as Prohesion, may consist of cycling between salt fog and dry conditions. More sophisticated automotive methods may call for multi-step cycles that incorporate humidity, along with salt spray and dry-off.

Within one Q-FOG chamber, it is possible to cycle through all of the most significant corrosion environments. Even the most complex test cycles can easily be programmed with the easy-to-operate Q-FOG controller.

Q-FOG chambers are available in three types. The base model SSP performs traditional salt spray and Prohesion tests. Model CCT performs salt spray, Prohesion, and most cyclic automotive tests. Model CRH adds variable relative humidity control and an optional shower function. All Q-FOG chambers are available in two sizes to fulfill a range of testing requirements.

Why Q-FOG?

Simple to Afford

Q-FOG corrosion testers were specifically designed to have the lowest total cost of ownership in the industry. Their low purchase price, high reliability, and low operating costs set a new standard for corrosion testers. And the new model CRH represents a breakthrough in price-performance for RH-controlled corrosion chambers. Now even the smallest lab can afford cyclic corrosion testing.

Simple to Use

Q-FOG cyclic corrosion testers are easy to install, easy to program, and easy to operate. Specimen mounting and evaluations are simplified with a low belt line and easy-opening lid. All models are completely automated and can operate continuously, 24 hours per day, 7 days per week, without supervision. The testers are smart enough to alert you to issues they may encounter during testing.

Simple to Maintain

We believe that just because a product is technical, it doesn't have to be hard to understand or difficult to maintain and repair. Instead of complicating our tester designs by loading them with extra or unnecessary features, we put our engineering effort into keeping things simple. Subsystems are modular, easy to troubleshoot and easy to replace. This makes typical maintenance and repair of Q-FOG testers simple enough that it doesn't require a field technician (but we're here if you need us).

Every feature of a Q-FOG tester was designed with simplicity and reliability in mind.

Q-FOG Models

Q-FOG SSP

for Prohesion or Conventional Salt Spray

Numerous accelerated corrosion tests may be performed in the Q-FOG base model SSP, including Prohesion, ASTM B117, ASTM G85, BS 3900, F4 & F9, DIN 50.021, ISO 9227, GB/T 10125 and many others. The SSP chamber is our most economical model, and can perform salt fog, dwell and dry-off functions.

Q-FOG CCT

for Research and Cyclic Automotive Tests with 100% Humidity

The Q-FOG model CCT has all the advantages of the model SSP, but adds the flexibility of including 100% humidity. This is another critical exposure condition to many cyclic corrosion tests. CCT units come equipped with a viewing window in the side of the lid and an internal light to allow easy monitoring of test conditions.

Q-FOG CRH

for Research and Cyclic Automotive Tests with Variable Relative Humidity Control

The Q-FOG model CRH represents a true breakthrough in the price-performance ratio of corrosion testers with RH control. It has all the advantages of the model CCT, but adds full variable humidity control through the use of an innovative air pre-conditioner. It is compatible with most major automotive corrosion test standards, such as GMW 14872, SAE J2334 and others from Ford, ISO, GB/T, VW, Volvo, Chrysler, Renault, etc. Additionally, this model includes a programmable shower function with an advanced cleaning feature for spray nozzles that prevents clogging frequently found in competitive chambers.

Key Features

1 Two Convenient Sizes for Each Model

All Q-FOG models (SSP, CCT, and CRH) are available in two convenient chambers sizes (600 and 1100 liters) to accommodate small and large specimen quantities. Caster wheel kits are available to allow for easy repositioning of the tester in laboratories with tight space requirements.

2 Easy Sample Mounting

The Q-FOG chamber has a low belt line and an easy-opening lid for easier access during sample mounting. Test panel racks, hanging rod kits, and flat grates are available to conveniently mount specimens of all shapes, sizes, and weights up to a maximum of 544 kg (1200 pounds).

3 Reinforced Fiberglass Construction

Q-FOG testers are made of solid, fiber-reinforced plastic. The robust, heavy-walled chamber and lid have low thermal conductivity for efficient, precise temperature control. Heat resistant plastic allow testing at higher temperatures than competitive cabinets.

4 Internal Solution Reservoir

Space utilization is maximized and maintenance is minimized with the Q-FOG machine's internal solution reservoir. The 120 liter reservoir has enough capacity for running most tests for 7 days or more. The reservoir has an integral salt filter and a built-in alarm to alert the operator when the solution is low.

5 Remarkably Simple User Interface

The Q-FOG tester's user interface is designed to be functional, highly reliable, and easy to use. The controller allows for complete self-diagnostic error checking and can be programmed in 5 user-selectable languages (English, German, Spanish, French, and Italian).

Rapid Chamber Temperature Cycling

Q-FOG testers can change temperatures exceptionally fast because of their unique internal chamber heater and cooling/dry-off blower. An additional air heater allows very low humidity dry-off exposures. Conventional water jacket chambers cannot produce low humidity or cycle rapidly. **See page 10**

Precise Control of Fog Dispersion

The Q-FOG tester has superior fog dispersion compared to conventional systems which cannot vary volume and distance independently. A variable speed peristaltic pump controls the amount of corrosive solution delivered to the spray atomizer, while the air pressure regulator controls the distance of the "throw." **See page 10**

Easy Operation & Maintenance

All components in a Q-FOG tester are positioned to allow easy access for calibration, inspection, and routine preventive maintenance. Sub-systems are modular for easy repair. The Q-FOG controller features complete self-diagnostics, including descriptive warning messages and automatic safety shut-down. **See pages 12-13**

Shower Module with Self-Cleaning Nozzles

The Q-FOG model CRH adds an optional shower module for uniform spray throughout the chamber, in accordance with many automotive test standards. Quick-disconnect spray nozzles have an innovative self-cleaning feature to prevent precipitate clogging, often found in competitive test chambers. **See page 11**

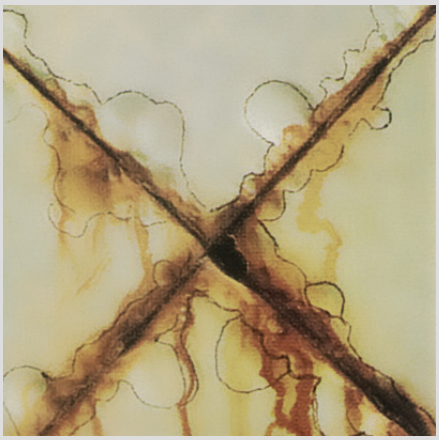
Relative Humidity Control

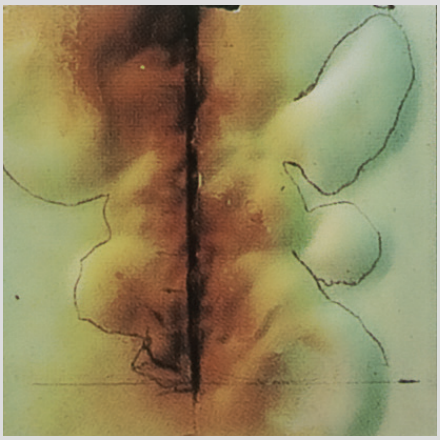
The Q-FOG model CRH features precise control of relative humidity through the use of an air-preconditioner (**see right**), for compatibility with most major automotive cyclic corrosion standards. Most temperature-controlled laboratories can be accommodated with this innovation. **More on page 11**

Q-FOG testers aren't loaded with unnecessary features — just the ones you need.

Corrosion Testing & Standards

Cyclic corrosion tests expose specimens to a series of different environments in a repetitive cycle. Simple tests may consist of cycling between two conditions: fog and dry. More sophisticated procedures (especially for automotive testing) call for multi-step cycles incorporating humidity, along with salt fog or shower functions, and dry-off.





Prohesion and Conventional Salt Spray

Numerous accelerated corrosion tests may be performed in Q-FOG model SSP, including Prohesion, ASTM B117, ASTM G85, BS 3900 F4 and F9, DIN 50.021, ISO 9227, and GB/T 10125, just to name a few.

Prohesion. This test uses one-hour fog and one-hour dry-off, rapid temperature changes, and a different corrosive solution to provide a more realistic test. Many researchers have found this test useful for industrial maintenance coatings.

Conventional Salt Spray. Continuous salt spray exposures are widely specified for testing components and coatings for corrosion resistance. Applications include: plated and painted finishes, aerospace and military components, and electrical and electronic systems.

Most of these tests are performed to particular specifications such as ASTM B117 (Salt Spray), and BS 3900 F4. These tests are widely used for relative corrosion testing. They are typically run at an elevated temperature and do not incorporate a dry-off cycle. They require heated, humidified air for the spray.

Cyclic Corrosion Tests

A more serious limitation of tests such as ASTM B117 is that they provide a continuous environment with no changes in conditions. In contrast, materials exposed to the weather experience cyclical changes in wetness, temperature, sunlight, and corrosive solution concentration. Corrosion in a cycling environment can be very different from corrosion in a continuous cycle, in terms of both the chemical reactions and the type of materials that will best resist corrosion.

As such, many automotive corrosion test methods typically call for exposing specimens to a repetitive cycle of salt spray, high humidity, low humidity dry-off, and ambient conditions. These test methods were originally developed as labor-intensive manual procedures. More recent cyclic automotive test methods, such as GMW 14872, incorporate controlled relative humidity conditions, which is often challenging to obtain in many lab conditions. These test methods sometimes call for a shower/rain step with higher flow than typical fine-mist salt fog. Ramp times are also often tightly controlled.

Alternating QUV exposure and Q-FOG cyclic corrosion testing can improve correlation for some materials.

Cyclic Corrosion Tests with UV Exposure

The QUV® accelerated weathering tester and Q-FOG cyclic corrosion testers have outstanding advantages on their own. But when used together, they are revolutionizing corrosion testing, particularly for industrial maintenance paints on bridges and other infrastructure applications.

Ultraviolet light stability of a coating can be a major factor in its corrosion resistance. Research indicates that a corrosion cycle alternating between one week in a QUV accelerated weathering tester and one week in a cyclic corrosion tester can give more realistic results than either conventional salt spray, or CCT or CRH alone. See ASTM D5894 for more information.

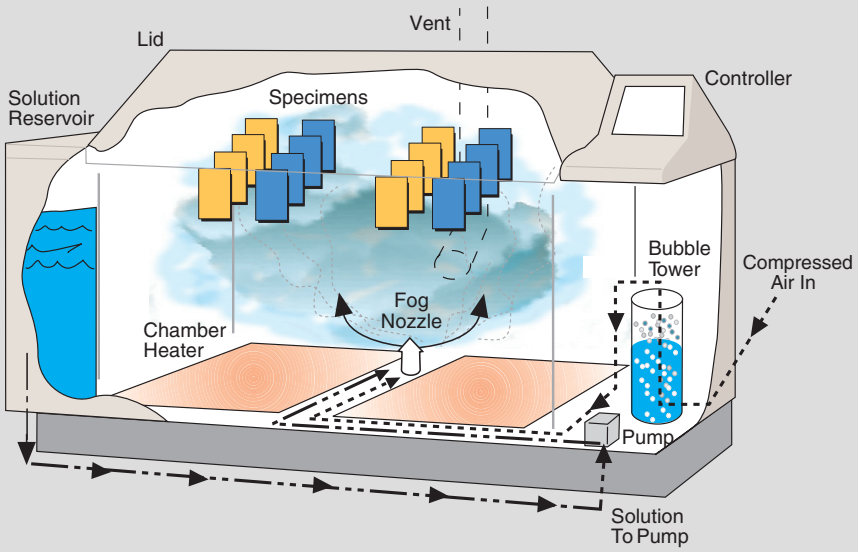
Cyclic Corrosion Testers

How They Work

Fog Function (All Models)

During the Fog Function, the corrosion tester typically operates as a conventional salt spray unit:

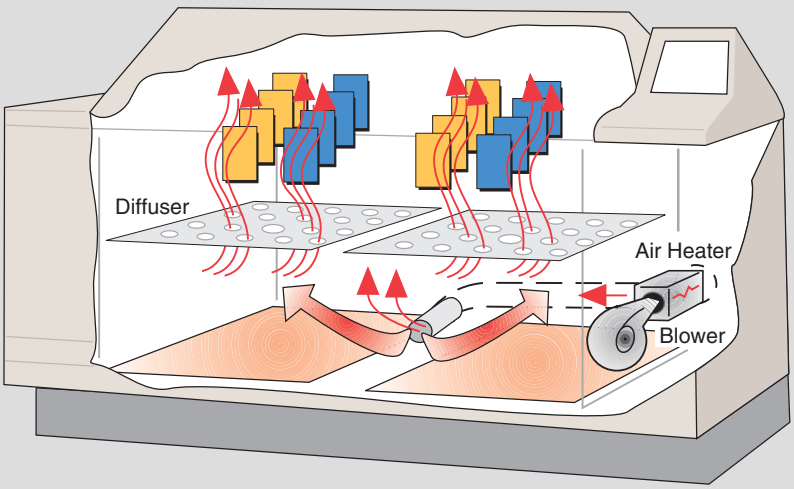
- Corrosive solution from the internal reservoir is pumped to the nozzle
- Compressed air is humidified by passing through the bubble tower on its way to the nozzle
- Nozzle atomizes solution air into a fine, corrosive fog mist
- Chamber heaters maintain the programmed chamber temperature



Dry-Off Function (Models SSP & CCT)

During the Dry-off Function, a purge blower forces room air over an air heater, through diffusers, and across specimens in the chamber. This creates a low humidity condition inside the chamber, drying the specimens. The chamber temperature is controlled by the chamber heaters and the air heater.

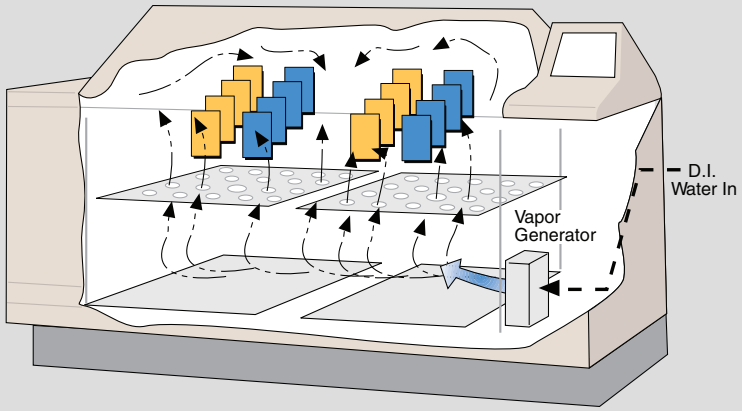
Q-FOG model CRH testers utilize the RH Function in place of the Dry-Off, Dwell, and Humid Functions. Dwell Function not shown for models SSP & CCT.



Humid Function (Model CCT Only)

During the Humid Function in CCT models, the chamber is maintained at 95-100% relative humidity by forcing hot water vapor into the chamber. Deionized water is required for proper operation.

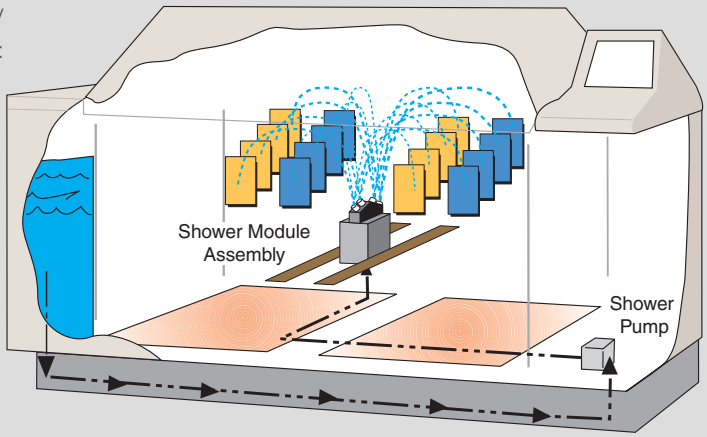
The vapor generator heater maintains the programmed chamber temperature.



Shower Function (Model CRH Only)

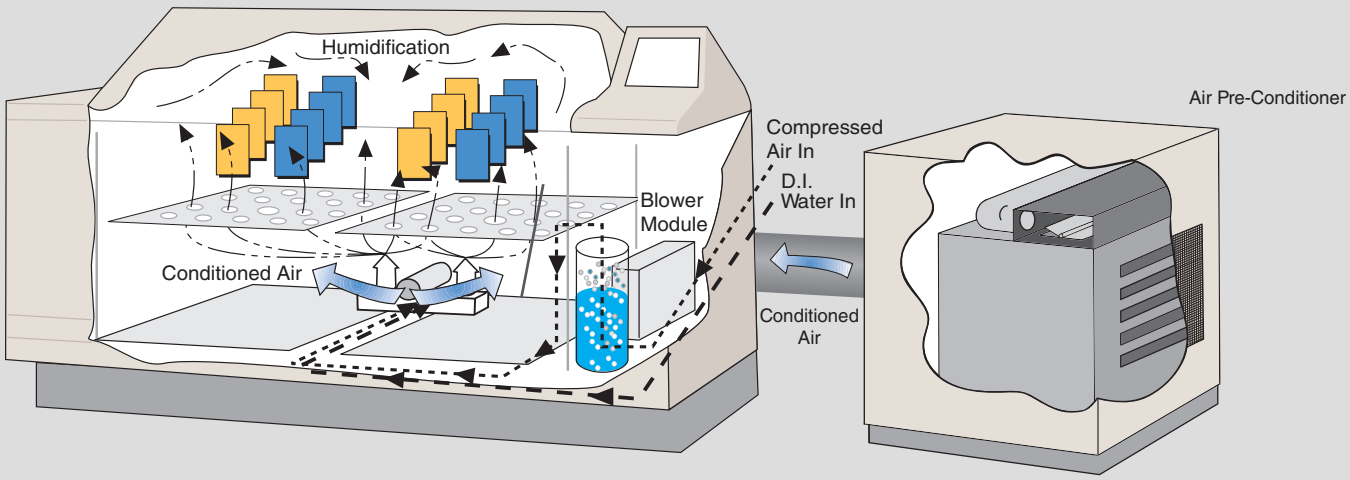
The Shower Function is used for some automotive test specifications. A user-adjustable volume of solution is uniformly sprayed onto specimens through specially positioned nozzles:

- Nozzles are mounted to a spray bar, which can be easily removed when using the Fog Function
- Spray droplets are much bigger, flow rates are much higher, and shower times are much shorter than the atomized solution mist in the Fog Function
- Shower on/off times can be directly programmed to allow for excellent control of corrosion rates



RH Function (Model CRH Only)

In CRH models, the chamber can ramp to and maintain a defined RH value and temperature through the use of the air pre-conditioner, the blower module, and special atomizing humidification nozzles. DI water is required for proper operation. Also, see operating manual for details on RH/temperature capabilities vs. laboratory condition requirements.



Operation

Q-FOG cyclic corrosion chambers are extremely simple to operate. Specimen mounting and evaluations are simplified with several specially designed specimen holder options. Programming is intuitive. All models are completely automated and can operate continuously, 24 hours per day, 7 days per week.

Specimen Mounting

Q-FOG chambers have a low belt line and an easy-opening lid for more convenient sample mounting.

Standard rack panel holders are available to accommodate a variety of flat specimen panel sizes. They are slotted at a 15 degree angle.

Hanging rods allow convenient mounting of small, three-dimensional parts and other odd-shaped test specimens.

Diffuser-level or rack-level specimen mounting grates can accommodate very large parts, up to 544 kg (1200 pounds) in total weight.

Programming

Designed to be both functional and easy to use, the Q-FOG controller can be programmed in five user-selectable languages (English, French, Spanish, Italian or German). Users can program and store up to 10 tests in memory, which has a battery back-up feature.

Standards

Q-FOG chambers are compatible with most major standards, including Prohesion, ASTM B117, GMW 14872, SAE J2334, and others from Ford, ISO, GB, VW, Volvo, Chrysler, Renault, etc. Several standards come factory pre-programmed for convenience.

Calibration & Maintenance

Q-FOG chambers are designed to be extremely low maintenance and user-serviceable. They are equipped with a number of on-board sensors to monitor and control the environment inside the chamber. Periodic calibrations and preventive maintenance items are made easy through thoughtful design.

Calibration

The Q-FOG tester's chamber temperature sensor (and RH sensor in CRH models) should be calibrated by the user every six months to ensure accurate and consistent results.

Calibrating the temperature and RH sensors takes only a few minutes. It requires simple tools, a calibrated reference thermometer, and an insulated container.

Preventive Maintenance

Q-FOG chambers are equipped with a routine service timer. Every 1000 hours of operation, a convenient reminder message: "Perform Routine Service" is displayed.

During this routine preventive maintenance, the bubble tower (used to saturate the compressed air for atomizing the salt solution) should be drained and refilled. Air and water filters should be cleaned at this time. It is also recommended to clean and wash down the chamber walls and heater.

Once per year, filters and peristaltic pump tubing are replaced, which takes only a few minutes.

Serviceability

Direct access to key maintenance or repair items is possible with a removable side access panel. The layout and position of all components in a Q-FOG tester were painstakingly designed to allow easy access for inspection and maintenance.

Troubleshooting

The Q-FOG controller features complete self-diagnostics, including warning messages and automatic safety shut-down.

An easy to understand user's manual allows most troubleshooting to occur even with novice users.

Accessories & Options

Specimen Holders

Test Panel Racks

Standard test panel racks are available to accommodate flat specimens, such as Q-PANEL® standard substrates. Racks can support up to 113 kg (250 pounds) each, and are slotted at 15 degrees from vertical. The 600 liter Q-FOG models can accommodate up to 160 specimens, 75 x 150 mm (3 x 6 in) in size, through 8 racks. The 1100 liter models can hold up to 240 specimens, using 10 racks.

Hanging Rod Kit

A standard hanging rod kit is available for small, three-dimensional, and odd-shaped specimens. Each of the 20 mm (3/4 in) diameter rods can support up to 45 kg (100 pounds), and can be easily installed. The kit contains 6 rods for a 600 liter Q-FOG model and 8 rods for an 1100 liter version. Simple hooks or wire-ties may be used to mount samples.

Mounting Grate Kit

For extremely large or heavy three-dimensional objects (such as metal wheel rims, engine parts, etc.), a rack-level or diffusion-level grate kit may be used. The Q-FOG tester's sturdy construction can support a well-distributed total load of up to 544 kg (1200 pounds), ensuring compatibility with even the heaviest of automotive and other components.

Start-Up Salt Kit

A convenient salt kit is available, containing a pre-measured and certified quantity of NaCl (530 g) which allows for compatibility with ASTM B117. Just add the recommended amount of water to obtain a 5% solution.

Shower Module

Some automotive industry standards (e.g. GMW 14872) require not just a fine mist salt fog, but a uniform salt solution shower. The Q-FOG CRH model features a standard shower module and anti-clog nozzles for full compatibility with these test methods.

Adjustable RH Control

Fully-adjustable relative humidity control is required by many cyclic automotive test standards, such as GMW 14872, SAE J2334, and others. The Q-FOG model CRH utilizes an innovative air pre-conditioner to accomplish precise RH control in most lab environments.

Summary

● Standard ◑ Optional

Feature	SSP	CCT	CRH
Two model sizes available (600 and 1100 liter)	●	●	●
Performs Prohesion and other Fog/Dry-Off cycles	●	●	●
Performs conventional continuous salt fog	●	●	●
Performs cyclic automotive tests requiring 95-100% humidity	–	●	●
Performs cyclic automotive tests requiring variable humidity control	–	–	●
Internal salt solution reservoir (120 liter)	●	●	●
Internal chamber heaters for fast temperature cycling	●	●	●
Corrosion-free reinforced fiberglass construction	●	●	●
Remarkably simple user interface for easy programming	●	●	●
Five user-selectable languages (English, French, Spanish, German or Italian)	●	●	●
Controller with self-diagnostics, error messages, safety shutdown	●	●	●
Salt Fog via variable speed peristaltic pump	●	●	●
Dry-Off (controlled temperature with forced air)	●	●	●
Dwell (controlled temperature without forced air)	●	●	–
Window & light	–	●	●
Programmable ramp times	–	–	●
Shower module with self-cleaning spray nozzles	–	–	◑
Specimen panel racks, hanging rods, and mounting grates	◑	◑	◑

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Contract Testing

Q-RACK
Outdoor
Exposure Racks

Our Global Network

Q-Lab headquarters are located in Westlake, Ohio USA, with sales and distribution facilities located in England, Germany, and China. Our A2LA-accredited laboratory facilities are located in Germany, Florida, and Arizona. We also maintain outdoor exposure facilities in Florida, Arizona, and Ohio. We support our customers through direct salespersons and distributors in over 60 countries, across 6 continents.

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